SURVEY AND REPORT
OF
PRESENT AND FUTURE LOAD REQUIREMENTS
OF
RURAL ELECTRIC COOPERATIVES

STATES OF
NORTH CAROLINA
AND
VIRGINIA

APPLICATIONS AND LOANS DIVISION
RURAL ELECTRIFICATION ADMINISTRATION
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TABLE OF CONTENTS

SURVEY AND REPORT OF PRESENT AND FUTURE LOAD REQUIREMENTS OF RURAL ELECTRIC COOPERATIVES 1/

PURPOSE OF REPORT

This study has been prepared by the Rural Electrification Administration at the request of the Power Division of the Department of the Interior for the purpose of ascertaining (1) the magnitude of electric loads now being served by Rural Electrification Administration financed electric cooperatives, and (2) those loads which may reasonably be expected to develop during the next ten years.

This report does not purport to establish the feasibility of the cooperatives serving all loads tabulated in the survey nor does it intend to show by inference that funds are or will be earmarked by the Rural Electrification Administration for service to such loads. Each application for REA loan funds will, as in the past, be considered on its own merits.

The necessity for this survey is occasioned by the imminent development of public hydro-electric generation sites in the State of Virginia by the U. S. Army Engineers, which will make public power available for distribution and resale by the Department of Interior as the marketing agent 2/ for such power. Hydro-electric generating stations have been authorized for construction at the Buggs Island and the Philpott sites on the Roanoke River. A steam electric generating plant at Radford, Virginia, is available to furnish firming power for these hydro-electric generating plants. The feasibility of developing additional hydro-electric

1/ Prepared by William G. Mills, Engineer, Applications and Loans Division, REA, USDA.
2/ Public Law No. 534 - Flood Control Act of 1944.

generating sites on the James River in Virginia is being studied at this time and it is probable that additional hydro generating stations will eventually be constructed on this river to become a part of the proposed power network. Other hydro generating sites on the Pee Dee-Yadkin and the Catawaba Wateree Rivers in North Carolina and South Carolina have been investigated and approved as to feasibility but have not been authorized at this time.

This survey covers the entire area of the State of North Carolina and all of the State of Virginia with the exception of the eastern shore and the twenty southwestern counties which are now served by the Appalachian Power Company and the Powell Valley Electric Cooperative at Jonesville, Virginia. The latter is now receiving adequate public power from the Tennessee Valley Authority transmission system.

Although the Department of the Interior indicated its interest in only those loads lying within a radius of approximately 100 miles of the Buggs Island and the Philpott power developments, it was considered desirable to include all of the REA-financed cooperatives operating in the States of North Carolina and Virginia except those mentioned in the foregoing paragraph.

Numerous municipal distribution systems throughout the State of North Carolina are anxious to secure low cost public power and have made application for such power to the Department of the Interior. The Rural Electrification Administration is not directly concerned with the activities of these bodies; therefore, their requirements have not been included in this survey.

No attempt has been made to determine the location of proposed generating stations; however, a supply point has been designated for each of the cooperatives and the magnitude of the electric loads has been

tabulated by cooperatives in order to demonstrate the need of a low cost source of public power.

The attached maps, labled "Drawing No. 1", and "Drawing No. 2", show

(1) The areas under consideration;

(2) The authorized electric generating stations;

(3) Tentative cooperative boundaries;

(4) Tentative points of delivery to each cooperative; and,

(5) A summary of anticipated KW demand and KWH consumption at the end of two, five and ten years for each cooperative involved.

SUMMARY AND CONCLUSIONS

The findings contained in this report indicate that there is a definite need for additional power development by public bodies on the rivers in the States of Virginia and North Carolina.

This survey indicates that within two years Rural Electrification Administration financed cooperatives in the State of Virginia will require approximately 20,000 kilowatts of generating capacity and 88,000,000 kilowatt hours of electrical energy. Anticipated growth of loads will result in an increased demand approximating 59,000 kilowatts and an annual power requirement of approximately 237,000,000 kilowatt hours within ten years.

Similarly, these tabulations reflect that the rural Electrification Administration financed cooperatives operating throughout the State of North Carolina will require a total of approximately 45,000 kilowatts in generating capacity and will provide a market for approximately 145,000,000 kilowatt hours of electrical energy within two years. It is estimated that the demands and consumptions of the North Carolina cooperatives will increase to approximately 125,000 kilowatts and 464,000,000 kilowatt hours, respectively, within the next ten years.

The foregoing estimates of demands and consumptions are based on the availability of adequate low cost power and an intensive power use program sponsored by the cooperatives.

Present generating capacity available from private utilities and municipal plants within this area is now inadequate to provide sufficient power to permit electrification of all of the rural areas of both of these states on an area coverage basis. Furthermore, notwithstanding recent rate reductions by private utilities in their wholesale contracts

with Rural Electrification Administration financed cooperatives, the price paid for power, and the limiting conditions which are made a part of some of these contracts, will tend to materially restrict the complete electrification of the rural areas.

In order to attain all of the aims of the Rural Electrification Administration and to provide maximum utilization of electrical energy on the farms it is urgent that development of the hydro-electric generating sites on the rivers in these two states go forward as rapidly as possible.

It is understood that definite plans have been made for the construction of two hydro-electric generating stations on the Rappahannock River in the vicinity of Fredericksburg and Salem Church. (See E and F, Drawing No. 1) The five Rural Electrification Administration financed cooperatives situated adjacent to this development are estimated to have a combined demand of approximately 6,700 kilowatts within two years and approximately 23,000 kilowatts within ten years.

Hearings are in process of being held on the desirability of the construction of a hydro-electric generating station at the Gathright and Falling Spring reservoirs to be constructed on the Jackson River in Alleghany County, Virginia. The four Rural Electrification Administration financed electric cooperatives adjacent to these sites will require approximately 7,600 kilowatts within two years and 20,000 kilowatts within ten years.

The four Rural Electrification Administration financed cooperatives in Virginia which lie closest to the authorized development at Buggs Island and Philpott on the Roanoke River are estimated to have a demand of 7,300 kilowatts within two years and 26,000 kilowatts within ten years. The requirements of these cooperatives may be expected to

utilize an appreciable part of the proposed electric generating capacity of these two sites. The increasing power requirements of other REA financed cooperatives in the north central and eastern part of North Carolina emphasize the desirability of further developments of hydro-electric generating stations on the Catawba and Pee Dee-Yadkin Rivers.

For these reasons it is strongly urged that the Department of the interior, as marketing agent for public power generated in connection with multiple purpose projects, give consideration to the feasibility of providing adequate low cost power to all of the Rural Electrification Administration financed cooperatives located within the service area of its proposed power facilities.

METHOD OF SURVEY AND SOURCES OF INFORMATION

Information for the study was secured from personal contact by field representatives of the Applications and Loans Division 3/ of the Rural Electrification Administration. Each cooperative in the area was visited. County Agents, cooperative managers, board members and state officials were interviewed.

Operating records were scrutinized and tabulated in order to secure a true history of the growth experienced by each of the cooperatives. The tabulations reflect the past and present demands and consumptions of each cooperative visited. Operating data have not been included in the report, however, these data are available in the files of the Applications and Loans Division of REA. The State Planning Commission in Richmond, Virginia, contributed information as to the future possible development of natural resources. Basic data sheets covering all of the counties in Virginia were furnished by the Regional Office, U. S. Department of Commerce Field Service at Richmond, Virginia.

The field survey in North Carolina was conducted in close cooperation with the North Carolina Rural Electrification Authority which made available all of the facilities of its office and supplied valuable information and assistance in making this study.

The tabulations of loads and descriptions of potential loads were of necessity confined to the areas served by the individual cooperatives rather than being tabulated by counties. A summary, by cooperatives, of total kilowatt demand and kilowatt hour consumption is contained in Tables V and VI of this report.

3/ Messrs. Frank J. Coover, Edward B. Barr and William G. Mills.

The character and type of individual loads making up the system total for each cooperative have not been included in the report due to the number of systems and the volume of material involved. However, such information with respect to each system is available in the files of the Applications and Loans Division, REA.

In the interest of progressive planning with respect to future expansion and load growth, estimates of loads have been made based upon load expectancy at the end of two, five and ten years. In determining such estimates of farm consumption and other loads, consideration was given to the experience of operating systems in areas of similar economic and productive characteristics; the application of electric power to productive use as determined by the prevailing types of farming and other related enterprises existing in the area; effect of electric service toward stimulation of new enterprises, and other economic activities in the community; the general progressiveness of the farm people and their willingness to adopt new methods and techniques with the use of electricity in farming operations; and last, but of major importance, the influence of low wholesale and retail power rates.

Rural industry and other power loads were included if such loads were now served or if there was a reasonable possibility that such power loads would develop and be served by cooperatives. Loads of this type which are included in the survey are based on known load requirements or KWH consumption and demands of similar plants already in operation.

The basis for the number of farm consumers to be served by each system in two, five and ten years was taken from the results of unelectrified farm surveys where available, or from estimates of the number of unelectrified farms made by cooperative officials and others familiar with the area.

Loads to be served through the acquisition of existing utility properties were included in instances where there was a reasonable expectancy and justification that such systems might be acquired.

Since time and available personnel did not permit a more detailed survey than has been made, the load estimates represent a judgment arrived at through experience and competent understanding of the factors affecting the future use of electricity in rural areas.

Even though most of the information collected in the field was assembled in January 1946 and may be considered as bearing that date, considerable supplemental data which have become available during the period from January to December 1946 have been included with the report.

DESCRIPTION OF AREA

The areas under consideration are those in the States of North Carolina and Virginia which are, or may be, served by Rural Electrification Administration financed cooperatives not now receiving low cost public power and which may be served by transmission lines emanating from the Philpott and Buggs Island electric generating stations to be constructed on the Roanoke River in Virginia (see Drawing No. 1). The area involved includes all or part each of 100 counties in the State of North Carolina and 78 counties in the State of Virginia. Due to the fact that the western 20 counties in Virginia are now adequately served with electric power, either from existing utilities or cooperatives now purchasing public power, this area has been omitted from the study. The two counties located on what is commonly called the "Eastern Shore", or "Peninsula of Virginia", have also been omitted for the reason that it would be impractical to extend transmission facilities to this area from the Virginia mainland.

Description of North Carolina

North Carolina has an area of 52,712 square miles extending from the Atlantic Ocean on the east to well into the Applachian Mountains on the west. Its climate varies from sub-tropical in the southeast to temperate in the western mountains. The average annual precipitation of 52 inches assures ample rainfall for the production of most crops.

Roughly the state is divided into three distinct areas, (1) the Costal Plain, which is low-lying land, in the eastern half of the state; (2) the Piedmont Plateau Region, extending from northeast to southwest through the central portion of the state; and (3) the Applachian Region, which is a mountainous area in the western part of the state.

The area east of the Appalachian Mountains is drained by several large

rivers which empty into the Atlantic Ocean. The western slopes of the Appalachians drain into the Mississippi Basin. The northeastern section of the state is drained by the Roanoke River, which enters the state from Virginia, and the Cape Fear, the Neuse and the Tar Rivers. Southwest of this drainage are are the Catawaba, the Yadkin and the Pee Dee Rivers, which have sources in the Blue Ridge Mountains and leave the state at the Southern boundary reaching the Atlantic Ocean through the State of South Carolina. Most of these eastern rivers are sluggish and slow moving; however, there are numerous hydro-electric developments on the Yadkin and the Catawaba Rivers. The western part of the state is drained by the Hiwassee, the Little Tennessee and the French Broad Rivers, which flow in a northwesterly direction into the Ohio River and thence to the Mississippi River. These rivers are more or less mountain streams which have cut deep gorges through the country and are much admired for their scenery.

The Coastal and the Piedmont Regions and the valleys in the Appalachian Region are excellently suited to the production of crops, chief among which are tobacco and cotton. In recent years the production of tobacco has increased while the production of cotton has steadily decreased due to the shortage of low-cost labor and the high cost of production. North Carolina leads the world in the production and manufacture of tobacco.

Table I shows the land use by regions or districts in the rural areas as of January 1944.

The Piedmont area, although being devoted to a large extent to agriculture, is also the center of manufacturing in the state. This is attributed mainly to the availability of ample hydro-electric power and to

TABLE I

COUNTY FARM INVENTORY AS REPORTED BY FARMERS TO TAX LISTING OFFICIALS DURING JANUARY 1944
OF ACREAGES OF LAND UTILIZATION 1/

DISTRICT OR REGION	TOTAL ALL RURAL (LAND TAXED) 1944 ACRES	FARM LAND UTILIZATION				
		TOTAL FARM LAND 1943 ACRES	CULTIVATED OR CROPPED LAND 1943 ACRES	IDLE, RESTING & LYING OUT 1943 ACRES	PASTURE CLEARED OPEN OR IMPROVED 1943 ACRES	WOODLAND AND ALL OTHER NON-CULTIVATABLE LAND 1943 ACRES
NORTHERN MOUNTAIN (NW)	1,949,000	1,655,000	370,000	81,690	357,900	845,410
WESTERN MOUNTAIN (W)	3,215,000	2,397,000	481,770	168,150	396,480	1,350,600
NORTHERN PIEDMONT (N)	3,465,000	3,135,000	943,600	195,200	162,160	1,834,040
CENTRAL PIEDMONT (C)	3,118,000	2,708,000	882,800	186,200	162,230	1,476,770
SOUTHERN PIEDMONT (S)	3,097,000	2,665,000	981,500	142,500	133,630	1,407,370
NORTHERN COASTAL (NE)	3,530,200	2,732,150	1,067,260	53,205	52,784	1,558,901
CENTRAL COASTAL (E)	3,507,000	2,601,000	1,077,500	61,060	47,710	1,414,730
SOUTHERN COASTAL (SE)	5,007,000	3,620,700	1,196,900	101,090	51,000	2,271,710
STATE	26,888,200	21,513,850	7,001,330	989,095	1,363,894	12,159,531

1/ NORTH CAROLINA AGRICULTURAL STATISTICS 1944.

the nearness of raw markets. In 1939 there was a total of 103 hydro-electric generating plants with a total capacity of approximately 950,000 h.p. A number of larger sites have been developed by private utilities but there are numerous industries (textile, flour and grain mills, etc.) which now derive power from individually owned hydro-electric plants and which are potential consumers of public power.

The state is adequately served by a network of railroads; however, due to the inroads caused by truck and bus transportation the mileage of trackage has decreased from approximately 5,800 miles in 1925 to approximately 4,600 miles in 1940. Rail transportation has been supplemented by 39 bus lines and 251 motor freight lines.

The state has one of the finest highway systems in the East, consisting of 11,309 miles of state highways and 47,385 miles of county roads. Of this mileage 10,946 miles were hard surfaced in 1940. Highways are being improved at the rate of approximately $30,000,000 annually and a huge post war highway improvement program has been planned by the State Highway Commission.

Description of Virginia

The "Old Dominion" State of Virginia lies to the north of North Carolina and is the most southerly of the Middle Atlantic States. The Potomac River separates it on the north from Maryland. It has a tidal shore line along the Atlantic Ocean of approximately 780 miles and extends west through the Blue Ridge and Allegheny Mountains to the States of West Virginia and Kentucky. There are three distinct regions, (1) the Coastal or Tidewater region along the eastern shore, (2) the Piedmont Plateau, extending from northeast to southwest through the central part of the state, and (3) the Appalachian Mountain region which is sometimes subdivided into the Blue Ridge, Great Valley and Allegheny Ridges. The upper

end of the Great Valley is known as the Shenandoah Valley, which is famous for its fertile lands and scenic attractions. This region, underlain by numerous subterranean caverns, provides one of the greatest tourist attractions in the central east. The area in the southeastern part of the state is low-lying, poorly drained and is known as the Dismal Swamp. The coast line north of the Dismal Swamp is indented by long estuaries of the lower Potomac, Rappahannock, York and James Rivers. Chesapeake Bay, into which these reivers flow, is the lower course of the Susquehanna River. The land between these estuaries is relatively flat and is suitable for the cultivation of crops, rainfall being adequate for farming without supplemental irrigation. To the west of the Coastal Plain, the Piedmont Plateau rises to an elevation of from 700 to 1,200 feet along the eastern foothills of the Blue Ridge Mountains. The sloping surface is gently rolling and moderately forested. The bulk of the manufacturing enterprises of the state is located in the Piedmont Section.

The Blue Ridge and Allegheny Mountains are separated by the Great Valley through which flows the Shenandoah River. The upper tributaries of the James and the Roanoke Rivers drain the central one-third portion of this valley and flow to the east through the Blue Ridge Mountains. The New River drains the southern one-third of the valley flowing through the Allegheny ridges to the west into the Ohio River.

Five major railroad systems originate in the state and radiate to the south and west. Hampton Roads, at the mouth of the James River, affords one of the best anchorages along the entire Atlantic coast and is frequently used for the assembling of naval fleets.

The State of Virginia has an excellent system of highways. In 1941

there were a total of 47,900 miles of public highways. Of this mileage 46,945 miles were state maintained highways consisting of 9,404 miles of primary and 37,541 miles of secondary roads. In 1940 the state expended approximately $27,000,000 on the construction and paving of state highways and at the end of 1941 there were 8,453 miles of primary and 6,185 miles of secondary highways surfaced.

ECONOMY OF THE AREA

Economy of North Carolina

Agriculture. Approximately 73 percent of the population of the state lives on farms. In 1945 there were 287,412 farms consisting of a total of 18,062,298 acres or an average of 65.6 acres per farm. Of the total number of farms, approximately 126,000, or 43.8 percent, were electrified at the end of June 1946. The value of the farm products sold is not yet available for the state in 1945.

In 1939 there were 278,276 farms in the state, of which 218,000 were operated by whites and the remainder (60,276) by negroes. Approximately 70 percent, or 41,994 of the negro operated farms were not owned by the operators. The total number of farm tenants in the state was 123,476 or approximately 45 percent. This constitutes a decrease in tenancy of approximately 3 percent since 1935.

North Carolina ranked fourth among all states in cash income from crops in 1939. It ranked first in production of tobacco and second in lespedeza seed and peanuts. Table II sets forth further data relative to agriculture in North Carolina.

Minerals: Although North Carolina does not rank among the top-most producing states in minerals, there are considerable mineral resources in the state. Approximately 30 percent of the total feldspar output of the United States is mined in North Carolina. The following value of mineral products was produced in the state in 1938:

Stone	$ 5,789,486
Clay products	3,324,461
Crude feldspar	295,800
Sand & Gravel	762,827
Talc	241,337
Mica	249,477
Gold	65,730
Silver	3,560
Miscellaneous	11,988,186

TABLE II

DATA RELATING TO AGRICULTURE
IN
NORTH CAROLINA 1/

Total Land area	1945	31,450,880	acres
Total Land in farms	"	18,862,298	
Number of farms	"	287,412	
Average acres per farm		65.6	
Number of farms with central station electric service (6-30-46)		126,000	

		Number of Farms Reporting	Value
Value of all farm products sold, traded or used by farm households	1939	274,236	$ 262,437,677
Livestock sold or traded	"	71,622	7,440,802
Cattle sold	"		3,187,493
Hogs sold	"		4,676,698
Sheep sold	"		131,290
Livestock products sold or traded	"	139,966	$ 18,322,728
Dairy Products	"	46,300	9,534,410
Poultry and poultry products	"	126,715	7,866,964
Crops sold or traded	"	227,392	$ 171,028,891
All crops harvested, total value	"		241,538,779
Corn for Grain	"		33,629,378
Wheat	"		4,556,020
Other grains seeds	"		12,612,838
Hay and forage	"		15,933,028
Cotton lint and cottonseed	"		26,279,120
Tobacco	"		109,358,911
Irish and Sweet Potatoes	"		11,014,379
Vegetables for sale and for home use			$ 18,424,024
Fruit and nuts	"		5,985,973
Forest products sold (from farms)	"		2,299,641

1/ U. S. Census, Agriculture, 1945; U. S. Census, 1940

* 274,236 farms reporting, or an average of $957 per farm

Manufacturing: As previously stated, manufacturing plays a leading role in the economy of the state. It ranked first in 1939 in the manufacture of textiles and tobacco products which furnished employment to approximately 240,000 people. Following is a list of the most important manufacturing enterprises and the value of products produced by each:

Classification of Industry	Number Establishments	Number Wage Earners	Value of Products
Cigarettes	10	15,375	$ 532,439,765
Cotton goods	341	109,795	324,208,238
Knit goods	263	46,230	119,739,791
Silks & rayons	29	13,889	52,716,278
Furniture	185	19,981	60,304,039
Lumber & timber products	804	18,243	48,839,846
Fertilizers	70	1,923	17,855,023
Flour & grain mills	118	682	12,261,290
Cotton seed oil, cake & meal	37	742	6,077,025
Non-alcoholic beverages	154	797	17,317,174
Woolen manufacturing	7	3,252	17,317,174
Paper	7	1,100	9,627,226
Publishing & printing	273	2,274	14,220,851
Men's work clothes	17	3,052	9,069,277

A majority of the above listed industries are already electrified either from central station systems or from individual plants. In the case of the latter, facilities serving numerous industrial plants are obsolete and many of them desire central station service.

Lumbering and Forest Products

In 1939 there were approximately 1900 sawmills which produced 1,042,122,000 bd. ft. of lumber, of which approximately 843,000,000 bd. ft. were soft wood, chiefly yellow pine. The lumber produced, in the order of its importance, was as follows: Yellow Pine (791,500,000 bd. ft.); Cypress (30,543,000 bd. ft.); White Pine (15,800,000 bd. ft.); Hemlock (4,900,000 bd. ft.). An appreciable quantity of hard wood was also produced and totaled approximately 200,000,000 bd. ft. Of this amount 80,500,000 bd. ft were

Chestnut, 33,650,000 bd. ft. were Tupelo and 26,100,000 bd. ft. were Yellow Poplar. Forest resources form the basis for quite an extensive furniture and lumber products manufacturing industry. Resin, turpentine and tar are produced in appreciable quantities. Further development of lumber and forest products has a bright future based on the supply of resources and the demonstrated ability of these forests to replenish themselves.

Commercial Fishing: Fishing is also an important industry and in the period 1938 - 1940 the approximate value of edible fish produced was $7,300,000.

Economy of Virginia

Agriculture: Virginia is not quite as thickly populated as North Carolina but has an average population density of 67.1 per square mile as compared with an average for the United States of 44.2 per square mile. The rural population represents about 65 percent of the total. Approximately three-fourths of the population is of the white race and the remainder are negroes. In 1945, about 65 percent of the total acreage of the state was occupied by 173,051 farms, averaging 94.5 acres per farm. Of the total number of farms approximately 72,500 or 41.9 percent were electrified at the end of June 1946. Approximately 20.3 percent of the total number of farms were operated by tenants. This compared with a proportion of farm tenancy in the United States of 38.7 percent in 1940.

Tobacco is cultivated in the section east of the Blue Ridge Mountains and is the most important cash crop. Other crops are cotton, peanuts, apples, soybeans, pears, cowpeas, grapes, buckwheat and sorgums. The Great Valley and the Alleghany Valley are unsurpassed regions for the production of hay. Clover, timothy, herdgrass or redtop and alfalfa are grown elsewhere in the state. Long seasons and abundant rainfall assure multiple cuttings of hay. Truck farming, dairying and poultry are becoming increasingly important in the agricultural economy of the state. The number of

TABLE III

DATA RELATING TO AGRICULTURE IN VIRGINIA 1/

Total land area	Jan. 1945	25,535,360	acres
Total land in farms	"	16,358,072	"
Number of farms	"	173,051	"
Average number acres per farm	"	94.5	"
Number of farms with central station electric service (6-30-46)	"	72,500	"
Percent tenancy		20.3	"

Total value of all farm products sold, traded or used on the farm (1944)	$314,601,258
Number of farms reporting (1944)	170,494
Average per farm	1,845

	Farms reporting	Value
1. All livestock and livestock products sold (1945)	125,419	$118,151,467
2. All crops sold (1945)	93,275	124,777,553
3. Farm products used by farm household (1945)	166,704	66,496,935

1/ U. S. Census, Agriculture, 1945

milk cows has increased from 340,000 in 1927 to 446,000 in 1941. Other cattle have increased during the same period from 367,000 to 521,000. The number of sheep on farms has remained fairly constant over the years at 380,000 head. The production of hogs has increased from 558,000 to 638,000 in this 14-year period.

Table III sets forth data relative to the comparative value of crops produced in Virginia.

Commercial Fishing: Three thousand square miles of tidal waters along the Atlantic Coast of the state make commercial fishing a profitable enterprise and in 1938 the catch of edible fish amounted to 237,331,000 pounds, having a value of $4,403,200, which exceeds that of all other Atlantic and Gulf States except Massachusetts and New York for that year. Approximately 57,000 acres of oyster planting grounds yield an average of 5,000,000 bushels of the finest oysters annually. The fishing industry provides employment for approximately 30,000 people.

Mineral Resources: Mineral resources of the state are abundant and varied. Quarrying and mining are carried on extensively throughout the state; however, there are rich mineral deposits which are as yet undeveloped. In 1938 the total value of minerals produced was $42,370,669, the most important of which were as follows:

Coal	$ 24,054,000
Stone	5,606,470
Sand & Gravel	2,186,111
Clay products	1,855,876
Lime	1,014,607

Granite, Limestone, marble, sandstone, slate and basalt are found in practically unlimited quantities throughout the mountain regions. In recent years an extensive vein of tungsten has been discovered extending across the entire mountainous region of the state and into North Carolina. The development of this resource should contribute materially to the use

of electricity throughout this region.

Lumbering and Forest Products: The Coastal Plain is covered with pine forests which merge westward to the hard woods of the Piedmont Section where oaks formerly prevailed, but where a second growth of pine now constitutes part of the forest. The Blue Ridge and Allegheny ridges are covered with pine, hemlock, white oak, cherry and yellow poplar; cypress grows in the Dismal Swamp and river birch is abundant along the streams of the Coastal Plain. Sweet gum and black gum are found in the swampy regions. The production of lumber and other wood products ranked third in importance in the state and the output of sawmills in the year 1939 was valued at $18,559,755; planing mills at $10,714,072; furniture factories $31,833,398; and cooperage, barrels and staves, $871,631.

Manufacturing: Manufacturing has steadily increased in the state. Manufactured products in the order of their importance are tobacco, textiles and furniture. Listed below are manufactured products in order of their value for the year 1939:

Tobacco	$ 352,490,441
Cotton mill products	31,871,947
Silk and rayons	80,334,030
Woolen mills	7,981,079
Ship building plants	65,126,212
Chemical plants	33,554,440
Paper manufactures	26,750,860
Railroad repair shops	25,122,541
Fertilizer	19,377,213
Flour and grain mill products	14,338,259
Wood pulp	17,072,846
Bakeries	12,193,874
Knitted goods	17,031,334
Men's work clothes	11,212,678
Printing & publishing	9,762,385

TYPES OF LOADS TO BE SERVED

Types of electrical loads which may be served by rural electric cooperatives in the States of Virginia and North Carolina are primarily those of consumers on farms and in rural areas and villages who have been unable in the past to secure adequate central station service. In addition to farm and village consumers there are certain rural industrial loads, the serving of which will facilitate the extension of electric facilities to the more widely scattered farms. The type of loads which are served now or which may be served in the future by the cooperatives are discussed in the following pages. As materials become available and feasibility is established, the cooperatives contemplate an extensive construction program to serve the remaining number of unserved farms and other loads.

Farm Loads:

Present uses of electrical energy on farms include lighting, refrigeration, cooking, pressure water system, milking machines, sparators, chick and pig brooders, stock water pumps and small feed grinders, in addition to miscellaneous small appliances. A number of cooperatives were energized during the early years of the war or very shortly before war time restrictions were imposed; for this reason members of such cooperatives have been unable to obtain many of the load building appliances which they might have secured under normal conditions. Other cooperatives which were energized during the pre-war period have since connected numerous members who have also been unable to obtain electric appliances. Consequently the average kilowatt hour consumption per farm member has lagged far behind the consumption which would have been attained had conditions remained normal.

When electrical appliances and equipment again become generally available it is logical to assume that a majority of rural homes will use electricity for most of the purposes set forth in the preceding paragraph. Due to intensive research and new developments occasioned by the war effort it is also logical to assume that during the post-war years many additional applications will be forthcoming for the use of electricity on farms and in rural communities served by Rural Electrification Administration financed electric cooperatives.

Future power requirements on farms will be augmented by the use of deep freeze walk-in refrigerators, air conditioning, hot water heating, blower fans on heating furnaces, and many other uses not now envisioned.

A majority of operators of large mechanized farms will install electrically powered machine shops equipped with motors and electric welders, etc.

The successful use and the demonstrated value of hay driers has been definitely established in parts of this area and hay driers are becoming more extensively used as a means of increasing the food value of hay and insuring against loss from inclement weather during the harvest season. It is anticipated that hay drying will become the generally accepted method of curing hay where adequate low cost power is available to those farmers who raise hay in appreciable quantities.

The farmers who feed stock are becoming increasingly conscious of the benefits derived from feed grinding. Value of the use of feed grinders and automatic storage systems has been proven in northwestern Virginia and it is anticipated that the more progressive farmers will install feed grinding equipment. A portable 5 or 7.5 h.p. motor with an estimated maximum demand of approximately 4 to 6 kilowatts appears to be generally

accepted as the most desirable method of powering both hay drying and feed grinding equipment.

In the area where bright leaf tobacco is produced there is a very definite trend toward the automatic control of heating either by means of oil burners or coal stokers. Efficiency of the curing has been improved by forced circulation of air by means of a blower. A number of cooperatives are already serving such installations and the Edgecomb-Martin County Electric Membership Corporation at Tarboro, North Carolina has records of consumption indicating that such installations will average approximately 500 kilowatt hours per season. This consumption will be almost doubled in areas where tobacco raisers also grow sweet potatoes because it is common practice for such farmers to utilize tobacco curing barns for the curing and storage of sweet potatoes.

The present and ultimate consumption of tobacco barns has not been included in the tabulation of loads for the individual projects but will contribute materially to the increase of the average monthly consumption per farm member.

Tobacco and sweet potato fields are started with plants which are previously cultivated in hotbeds and there is a definite application of electricity for this purpose. A number of farmers have conducted experiments utilizing power by means of sub-surface cables for the artificial heating of plant beds and this method has proven highly successful. It is anticipated that there will be increasingly wide spread use of electricity for this purpose which will contribute greatly to the average consumption for such farms.

Certain counties in the area under consideration are devoted mainly to the production of Irish potatoes and sweet potatoes. In such counties

there are numerous potato grading cellars, a few of which are now electrified; operators of others have expressed a desire for electricity. It is estimated that the lighting and grading machinery of the average potato cellar will have an approximate demand of 8 kilowatts and an average consumption of 20,000 kilowatt hours annually. Some of the larger potato cellars register a maximum demand of approximately 15 kilowatts with an annual consumption of approximately 45,000 kilowatt hours while some of the smaller installations have a demand of approximately 2 kilowatt and an annual consumption of approximately 3,000 kilowatt hours. The load estimates for each of the individual projects are based on the size of the cellars encountered in the area.

Irrigation of crops has not been practiced in any part of the area under consideration on an extensive scale; however, there are a few farmers in the Shenandoah Valley who are now pumping water from the existing rivers to irrigate truck and hay crops.

In central eastern North Carolina, near Goldsboro, experiments have been made in sprinkler irrigation which seem to have some merit. It is possible that in the future agriculturalists will rely upon this type of irrigation as a means of increasing crop yields rather than present methods. If such a load develops it will increase considerably the maximum demands and annual kilowatt hour consumptions estimated in this report; however, no such loads are included in the estimates at this time.

Table IV illustrates the wide number of possible applications of electrical power on the farms and dairies and in the farm homes, together with the average kilowatt hour consumption which may be expected from their use.

In order to arrive at a basis for estimating the demands and consumption of electricity on the farms it has been necessary to take into consideration the ability of the member consumers to purchase and utilize

electric appliances and machinery which contribute to the over-all consumption of energy. The economy of the counties covered in this study varies greatly. In the Coastal regions and in areas where percentage of tenancy is high and per capita income low, the ultimate average consumption per member will be lower than that in more prosperous regions. To the contrary, in areas where dairying is predominant and farms large and prosperous, average consumption per member may be expected to be considerably higher than that attained in extremely low income areas. There are tabulated below three basic estimates of consumption which were applied to the various cooperatives according to the economic conditions of the area in which they operated:

	KW DEMAND PER MEMBER (Peak responsibility)	KWH CONSUMPTION PER MEMBER PER MONTH
Schedule A		
2 yrs.	.5	125
5 yrs.	.8	200
10 yrs.	1.0	250
Schedule B		
2 yrs.	.5	100
5 yrs.	.6	150
10 yrs.	.8	200
Schedule C		
2 yrs.	.4	80
5 yrs.	.5	120
10 yrs.	.7	160

TABLE IV

FARM EQUIPMENT AND POWER IT USES

Appliance (Farm Equipment)	Annual KWH Consumption
Lighting	
(a) General Barn	24
(b) Poultry Laying House (100 Birds)	35
(c) Poultry Brooding House	5
(d) Dairy Barn	
(1) North	80
(2) Mid-Continental U. S.	60
(3) South	35
(e) Dairy Milk House	35
(f) Beef Cattle Barn	12
Air Compressor	35
Barn Cleaner (twice daily)	120
Barn Ventilator Fan (dairy)	200
Blower - Grain (1,500 bu.)	35
Blower - Roughage	100
Brooder - Pig (per litter)	25
Brooder - Lamb (per 100 lambs)	100
Brooder - Chick (Hover) (3/4 kwh per chick) (500 chick brooder)	360
Brooder - Chick (Battery 1200 chick size)	1200
Churn	3
Cordwood Saw (for fuel wood) (15 cords)	30
Corn Sheller (small motor) (500 bu.)	25
Cream Separator (72,000 lbs. milk)	35
Drill Press	12
Egg Cooler (fan type)	25
Electric Hotbed (Cable Type) (2-sash bed)	240
Ensilage cutter (50 tons)	50
Feed Chopper	12
Feed Grinder	120-600
Fence (electric)	50
Feed Mixer	12
Flour and Cereal Mills	6
Fruit Cleaner	60
Fruit Grader	60
Garden Watering (1/4 acre) (6" water)	75
Grain Dryer (per 1000 bushels)	1500
Grain Elevator (per 1500 bu.)	5
Hay Drier (per 50 tons)	2500
Irrigation	
(1) Shallow Well (15' lift) (per 10 acre-feet)	360
(2) Deep Well (75' lift)(per 10 acre-feet)	1800
(3) Surface Water (15' lift)(per 10 acre-feet)	360
Milk Cooler (Immersion)(1 kwh per can per month)	900
Milking Machine (15 cows)(Milked 10 months)	400
Potato Grader (small motor)	60

TABLE IV - Continued

Appliance (Farm Equipment)	Annual KWH Consumption
Roughage Elevator	5
Seed Cleaner	3
Soil Sterilizer (for 2-sash bed)	30
Stock Tank Heater	150
Sugar Cane Press	300
Sweet Potato Curing (Southern States)	1800
Tobacco Curing (Stoker)	18
Tool Grinder	25
Vegetable Grader	60
Water Heater (dairy)	1500
Water Pump (deep well)	240
Water Pump (shallow well)	180
Welder	100
Wood Saw (bench)	12

TYPICAL ELECTRICAL HOME EQUIPMENT AND POWER IT USES

Appliance (Domestic)	
Lighting (Southern States)	240
Clock	18
Clothes Drier	250
Dishwasher	30
Fan, Ventilator	25
Fan, Furnace	240
Food Mixer	25
Freezer Cabinet (walk-in)	1500
Freezer Cabinet (reach-in)	900
Heater, Space (Radiant)	70
Hot Plate	70
Iron	60
Ironing Machine	120
Oil Burner	300
Percolator	60
Radio	100
Range	1200
Refrigerator	360
Roaster	480
Room Cooler	800-1200
Sewing Machine	10
Stoker, Coal	240
Toaster	35
Vacuum Cleaner	20
Waffle Iron	25
Washing Machine	35
Water Heater	2880

Rural Industries

In rural areas with which we are concerned numerous and varied industrial enterprises have been established in connection with the natural resources of the area or closely related to farming operations in areas devoted to agriculture. Specific types of rural industries are discussed in the following paragraphs setting forth the general characteristics and requirements of each type of industry.

Poultry Hatcheries: Chicken and turkey raising is becoming more important in the agricultural economy of the area. Numerous existing hatcheries have applied to operating cooperatives for electric service and it is anticipated that additional hatcheries will be installed to keep pace with the growing demand for chicks and poults. The average commercial hatchery will have an approximate demand of 10 kilowatts and an average annual consumption of approximately 70,000 kilowatt hours.

Poultry Dressing Plants: Due to the growth of poultry enterprises throughout the area a few poultry dressing and processing plants have been established. The establishment of other plants is probable. One such plant, now served by the Shenandoah Valley Electric Cooperative, has a maximum demand of 60 kilowatts and an estimated annual consumption of 250,000 kilowatt hours.

Feather Processing Plants: One feather processing plant has been established in the Shenandoah Valley in connection with the fast growing poultry industry. This plant is to be connected to the cooperative's lines and has a maximum demand of 60 kilowatts and an annual consumption of approximately 60,000 kilowatt hours.

Feed Mills: There are at present numerous commercial feed grinding mills operating throughout the area. In some cases mills are already electrified;

however, in other cases they are powered by gasoline or diesel engines or water power. In a number of instances mills have made application to the local cooperative for electric service and no doubt will be served within a reasonable period of time if adequate low cost power is available. One such feed mill, located in Fauquier County, in the territory served by the Prince William Electric Cooperative, Incorporated, at Manassas, Virginia, will have a maximum demand of approximately 50 kilowatts with a load factor approximating 33 percent and an estimated annual consumption of 144,000 kilowatt hours. Other mills to be served will have considerably lower demands and consumptions.

Cold Storage Plants: The processing of perishable truck crops and fish products in various parts of Virginia and North Carolina necessitates the installation of quick-freezing and cold storage plants. It is estimated that the average plant for such purpose will have a maximum demand of 15 kilowatts at a 60 percent load factor, resulting in an average annual consumption of approximately 80,000 kilowatt hours. The Mutual Cold Storage Plant has recently been constructed at Timberville, in the Shenandoah Valley of Virginia, and will be served by Virginia 11 Rockingham. This plant is considerably larger than the average cold storage establishment and will have a connected load of approximately 365 h.p. The maximum demand is estimated at 200 kilowatts and the estimated annual consumption at 1,200,000 kilowatt hours.

Ice manufacturing plants located in rural areas or small villages have made application for electric service from the Four-County Electric Membership Corporation at Burgaw, North Carolina. One such plant has a maximum demand of 300 kilowatts with approximately a 20 percent load factor and an annual consumption of 500,000 kilowatt hours.

Prior to the war there was an increasing demand on the part of rural people for individual cold storage locker plants and in very nearly all parts of the area such plants had been built or were planned for construction. The need has been only partially satisfied and additional plants are being planned in various parts of the area. The average locker plant, having some 300 to 400 lockers, will have an average annual consumption of 15,000 kilowatt hours.

Canning Plants: There are several fruit and vegetable canning plants operating throughout the area which are more conveniently powered by electricity and which will doubtlessly be converted to electric power if adequate low cost power is made available. One such canning plant, now being served by the Shenandoah Valley Electric Cooperative, has a maximum demand of 70 kilowatts but due to its seasonal operation it uses only approximately 25,000 kilowatt hours annually.

Fish Processing Plants: The Coastal areas of both Virginia and North Carolina are devoted largely to fishing. There are several fish processing plants which manufacture fish oil and fertilizer. The operators of several such plants have made application to cooperatives for electric service. One such plant has an approximate demand of 100 kilowatts and an annual consumption of approximately 400,000 kilowatt hours. Two other fish canning plants, having an estimated maximum demand of approximately 20 kilowatts and an annual consumption of approximately 90,000 kilowatt hours each, have also requested service. The above applications have been denied due to the inadequacy of present power sources, but will doubtlessly be served when adequate power supplies are available.

Drug Factories: The Park Davis Pharmaceutical Company is planning the construction of a drug factory in the territory served by the Prince

William Electric Cooperative at Manassas, Virginia. At the present time it appears likely that this factory will be located on the cooperative's lines. The estimated demand will approximate 100 kilowatts at a 70 percent load factor resulting in an annual consumption of approximately 600,000 kilowatt hours.

Lighthouse Beacons: Numerous lighthouse beacons, which are now operated by individual electric plants, are situated along the coastal areas. Such beacons will have an average demand of approximately 4 kilowatts and an annual consumption of approximately 10,000 kilowatt hours. It is anticipated that a majority of those beacons will be connected to central station service as soon as it becomes available.

Communication Facilities: The American Telephone and Telegraph Company is undertaking an extensive post-war program of converting overhead toll lines to underground cable necessitating the installation of additional repeater stations located approximately 30 miles apart. It is probable that a number of these stations will be located in the areas under consideration and that cooperatives will be in a position to furnish them with central station service. It is estimated that each of these stations, depending upon size of course, will have an approximate demand of 5 kilowatts and an annual consumption of approximately 20,000 kilowatt hours.

Air Beacons: There are numerous air beacons located along established air routes traversing the area. A large percentage of these are now being served from existing utilities; however, there are some beacons in isolated areas which are operated by individual plants. It is the intention of the Civil Aeronautics Administration to provide central station service to these facilities wherever possible. It is probable that as a result of the increasing emphasis on aviation, many new air routes will be established

necessitating the installation of additional markers and beacons. The average airway beacon will have a demand of approximately 2 kilowatts and an annual consumption of approximately 6,000 kilowatt hours.

Radio Stations: Recent rulings of the Federal Communications Commission require that all radio station facilities be located outside the corporate limits of cities and towns. This ruling will result in the relocating of existing broadcasting facilities and the locating of new facilities in rural areas. It is anticipated that development of television will result in a large increase in the number of radio rebroadcast stations, a large percentage of which should be served by rural electric cooperatives.

Boat Building: It is expected that boat building and ship facilities will furnish a major contribution to the magnitude of electric loads to be served by cooperatives operating along the coastal areas. Several small boat builders have indicated a preference for electric power when adequate low cost power is made available. It is anticipated that the average boat building establishment will have a demand of approximately 20 kilowatts, an annual consumption of approximately 45,000 kilowatt hours.

Fertilizer Plants: The area under consideration is one of the oldest agricultural sections in the United States. Large amounts of fertilizer are required to condition the soil and to insure high productivity and numerous fertilizer factories are operated throughout the area converting lime and fish products, etc., into commercial fertilizer. Several such enterprises are being served by cooperatives and numerous others have made application for service.

Pisciculture: Several small and some large fish hatcheries are located in the area and are served by cooperatives. The demands of these establishments vary from 5 to 10 kilowatts to as much as 200 kilowatts. The

Burke-McDowell Electric Membership Corporation at Morganton, North Carolina, anticipates serving two such establishments having a maximum demand of 200 kilowatts each with an estimated load factor of approximately 30 percent. Other smaller plants are being, or will be, served by other cooperatives.

Brick Manufacture: There are numerous clay deposits throughout the area which are suitable for the manufacture of bricks. It is anticipated that several brick manufacturing establishments having maximum demands varying from 50 kilowatts to 250 kilowatts will be served by REA-financed electric cooperatives.

Potteries: At least one pottery will be served by the Central Electric Membership Corporation at Sanford, North Carolina. It is the intention of the owner to install complete electric machinery including a circular dry kiln which will contribute materially to the power requirements of this cooperative. One other pottery in this area may be electrified in the near future.

Dairy Products Manufacturing Plants: Dairying and dairy products are assuming more importance in the agricultural and industrial economy. In addition to the application of electricity on the individual dairy farms, numerous dairy products manufacturing plants, such as milk pasteurizing and cheese plants, are now in operation. The Blue Ridge Electric Membership Corporation at Lenoir, North Carolina, is now serving several such plants and anticipates serving additional plants within the cooperative's limits. The increased emphasis on dairying in general will probably result in the establishment of additional dairy products plants. This is particularly true at Wadesboro, North Carolina, where the Biltmore Dairy Products Company at Biltmore, North Carolina, is purchasing approximately 75 percent

of the milk output of the area and is planning the construction of a condensed milk or cheese factory in the very near future.

Rural Machine Shops: The present trend toward the mechanization of farming operations has resulted in the establishment of numerous commercial repair shops located throughout the rural areas devoted primarily to the repair and maintenance of farm machinery. While the loads of such enterprises are not large, the number of such establishments is rapidly increasing and it is anticipated that a considerable number will be served by electric cooperatives.

Drawbridges: Throughout the coastal areas there are numerous navigable rivers which are spanned by drawbridges. Several such bridges are now powered by electricity; others have made application to operating cooperatives for electric service.

Temporary Loads: During the recent war many temporary Army and Navy installations have been established throughout the area. Several of these are now being served by electric cooperatives; however, permanancy of such installations is problematical. Such loads have been included in individual cooperative's load analysis for the initial two-year period only.

Tobacco Re-Drying Plants: As stated previously in this report, the production and manufacture of tobacco constitutes one of the most important components of the economy of the area. Proper conditioning of raw tobacco is very necessary to the finished product. At least one tobacco re-drying plant, having a maximum demand of approximately 40 kilowatts, will be served by an electric cooperative included in this survey.

Soapstone Mill: At least one soapstone mill is located in the area. This mill has been idle for the past few years but the management has

indicated that operations will be resumed when adequate low cost electric power is available. This mill will have an approximate demand of 20 kilowatts and an annual consumption of approximately 50,000 kilowatt hours.

Box and Crate Factories: One cooperative in the area has received application for power from two box and crate manufacturing concerns producing crates for fish and vegetable packing. The average demand of such a plant will be approximately 40 kilowatts with an annual consumption of approximately 175,000 kilowatt hours.

Sawmills: Some cooperatives have applications pending for service to permanently located sawmills. It is estimated that the average demand of such mills would be approximately 50 to 100 kilowatts and the average consumption would be approximately 100,000 to 350,000 kilowatt hours annually.

Furniture Manufacturing: There are several small furniture manufacturing plants which will be electrified when adequate low cost power is available. The operating cooperatives in whose territory such plants are located have indicated that the plants will each have a demand of approximately 10 kilowatts, consuming approximately 35,000 kilowatt hours annually.

Other large furniture factories, located within the area and served by lines which might be acquired by operating cooperatives, have an average demand each of approximately 25 kilowatts and an estimated consumption of 60,000 kilowatt hours per year.

Planing and Recut Mills: Throughout the area there are numerous planing and recut mills manufacturing finished lumber. One such mill, now served by the Virginia Electric Cooperative at Bowling Green has a maximum demand

of approximately 60 kilowatts and an annual consumption of approximately 72,000 kilowatt hours.

Woodworking Factories: The possibility of manufacturing wooden novelties and nicknacks from the waste blocks of excelsior mills has been explored and several such plants are in process of being developed. It is estimated that such a plant would require a maximum demand of approximately 20 kilowatts and have an annual consumption of approximately 50,000 kilowatt hours.

Excelsior Mills: In some sections of the area there are numerous excelsior mills requireing approximately 60 h.p. on a line shaft driving several shredders. If adequate low cost power were available and waste blocks could be disposed of profitably, all of these mills would convert to electric power. One cooperative is serving the lighting load of eight such mills at the present time. It is estimated that the maximum demand of each of these plants would average approximately 50 kilowatts and would have an annual consumption of approximately 120,000 kilowatt hours annually.

Electric Dry Kilns: At least one electric dry kiln for seasoning lumber will be connected to the cooperative's lines. The French-Broad Electric Membership Corporation at Marshall, North Carolina, has an application for service from a dry kiln requiring a maximum demand of approximately 60 kilowatts. The expansion of this plant will increase the demand to approximately 100 kilowatts within the next two years. It is probable that additional dry kilns will be established throughout the lumbering areas and some of these will doubtless be served by electric cooperatives.

Plywood: The manufacture of plywood from the lumber resources of the area will contribute to the magnitude of electric loads to be served by rural electric cooperatives. The South River Electric Membership Corporation

at Stedman, North Carolina, anticipates supplying the power requirements of one plywood factory having a demand of approximately 100 kilowatts. Other such establishments probably will be served by other cooperatives.

Mining: Development of the underlying minerals of the mountainous sections of the area will provide a huge potential market for adequate low cost power. Numerous mining enterprises are being served by cooperatives and other mine operators have applied to the cooperatives for electric service. An extensive vein of tungsten has been discovered which extends through the Piedmont Sections of North Carolina and Virginia. There is a large tungsten mine in the northern part of Vance County, which is being served by the Carolina Power and Light Company. It is probable that additional mines will be opened and some of these will doubtless be served by electric cooperatives. Feldspar, mica and pyrophyllite are now being mined in the mountainous sections of North Carolina. Deposits of copper and ilmenite are known to exist and are mined to some extent. The further development of these deposits will contribute to the magnitude of electric loads to be served by the Rural Electrification Administration financed cooperatives.

The central area of North Carolina is underlain with extensive coal deposits. A few coal mines are in operation at present and it is anticipated that with new processes being developed to utilize the by-products of coal that additional mines will be opened. There are numerous lime and granite quarries located in the rural areas of both states. Several of the quarries are now being served by cooperatives and others are desirous of obtaining adequate low cost electricity.

The Bureau of Mines maintains an experimental station near Leesburg, Virginia. The cooperative is now serving part of the station's power

requirements and it is anticipated that when suitable rates are establised the entire demand of approximately 100 kilowatts will be served by the co-operative.

Textiles: The manufacture of cotton, wool and rayon textiles constitutes one of the most important phases of the industrial development in the Piedmont Section of both states. The availability of adequate low cost power will make it possible for Rural Electrification Administration financed cooperatives to serve numerous large textile mills, as well as smaller allied enterprises such as hosiery mills, thread mills, rug manufacturing and numerous other enterprises, the electrification of which will improve the economic position of the cooperatives, as well as facilitate the extension of electric service to the more sparsely settled areas.

ESTIMATE OF LOADS

The tabulation of loads and descriptions of potential loads were of necessity confined to areas served by the individual cooperatives rather than being tabulated by counties. These estimates for individual cooperatives are broken down into the number of each type of consumer and show the maximum demand of, and the factor applied to each, in order to arrive at the proportion of kilowatt demand that each type of load contributes to the system total.

Details of the above breakdown showing the number, character and type of individual loads making up the system total for each cooperative have not been included in the report due to the number of systems and the volume of material involved; however, such information is available for inspection in the files of the Applications and Loans Division, REA.

A summary, by cooperatives, of the total kilowatt demand and kilowatt hour consumption is contained in Tables V and VI. Table V contains a summary of anticipated KW demand and KWH consumption for the years 1948, 1951 and 1956 for each of the cooperatives in North Carolina. Table VI sets forth similar data for cooperatives in Virginia.

Drawings No. 1 and No. 2 show the geographical distribution and magnitude of anticipated loads in the area involved together with tentative delivery points for public power for each cooperative.

As a ready reference to the REA financed cooperatives included in the survey, the following tabulation sets forth the cooperatives' names, designations and locations:

Name	Designation	Location
Haywood Electric Membership Corporation	North Carolina 10 Haywood	Waynesville

Name	Designation	Location
Pitt-Greene Electric Membership Corporation	North Carolina 14 Pitt	Farmville
Edgecombe-Martin County Electric Membership Corporation	North Carolina 16 Edgecombe	Tarboro
Four-County Electric Membership Corporation	North Carolina 21 Sampson	Burgaw
Blue Ridge Electric Membership Corporation	North Carolina 23 Caldwell	Lenoir
Rutherford Electric Membership Corporation	North Carolina 25 Rutherford	Forest City
Roanoke Electric Membership Corporation	North Carolina 31 Halifax	Rich Square
Piedmont Electric Membership Corporation	North Carolina 32 Person	Hillsboro
Halifax Electric Membership Corporation	North Carolina 33 Martin	Enfield
Pee Dee Electric Membership Corporation	North Carolina 34 Anson	Wadesboro
Davidson Electric Membership Corporation	North Carolina 35 Davidson	Lexington
Randolph Electric Membership Corporation	North Carolina 36 Randolph	Asheboro
Davie Electric Membership Corporation	North Carolina 37 Davie	Mocksville
Harkers Island Electric Membership Corporation	North Carolina 38 Carteret	Harkers Island
Union Electric Membership Corporation	North Carolina 39 Union	Monroe
Brunswick Electric Membership Corporation	North Carolina 40 Brunswick	Shallotte
Jones-Onslow Electric Membership Corporation	North Carolina 43 Jones	Jacksonville
French Board Electric Membership Corporation	North Carolina 46 Madison	Marshall
Wake Electric Membership Corporation	North Carolina 47 Wake	Wake Forest

Name	Designation	Location
Cornelius Electric Membership Corporation	North Carolina 48 Mecklenburg	Cornelius
Surry-Yadkin Electric Membership Corporation	North Carolina 49 Surry	Dobson
Tri-County Electric Membership Corporation	North Carolina 50 Wayne	Goldsboro
Lumbee River Electric Membership Corporation	North Carolina 51 Hoke	Raeford
South River Electric Membership Corporation	North Carolina 52 Cumberland	Stedman
Burke-McDowell Electric Membership Corporation	North Carolina 53 Burke	Morganton
Carteret-Craven Electric Membership Corporation	North Carolina 55 Craven	Beaufort
Pamlico-Beaufort Electric Membership Corporation	North Carolina 56 Pamlico	Grantsboro
Central Electric Membership Corporation	North Carolina 58 Lee	Sanford
Woodstock Electric Membership Corporation	North Carolina 59 Beaufort	Belhaven
Ablemarle Electric Membership Corporation	North Carolina 66 Chowan	Hertford
Craig-Botetourt Electric Cooperative	Virginia 2 Craig	New Castle
Shenandoah Valley Electric Cooperative	Virginia 11 Rockingham	Dayton
Virginia Electric Cooperative	Virginia 22 Caroline	Bowling Green
Southside Electric Cooperative	Virginia 27 Nottoway	Crewe
Northern Neck Electric Cooperative	Virginia 28 Lancaster	Warsaw
Central Virginia Electric Cooperative	Virginia 29 Nelson	Lovingston

Name	Designation	Location
B-A-R-C- Electric Cooperative	Virginia 30 Bath	Millboro
Mecklenburg Electric Cooperative	Virginia 31 Mecklenburg	Chase City
Northern Piedmont Electric Cooperative	Virginia 35 Madison	Culpepper
Prince George Electric Cooperative	Virginia 36 Prince George	Waverly
Community Electric Cooperative	Virginia 37 Nansemond	Suffolk
Tri-County Electric Cooperative	Virginia 38 Loudon	Leesburg
Prince William Electric Cooperative	Virginia 41 Prince William	Manassas

TABLE V

SUMMARY OF LOAD ESTIMATES
(NORTH CAROLINA)

REA SYSTEM DESIGNATION	KILOWATT DEMANDS			KILOWATT HOUR CONSUMPTION		
	1948	1951	1956	1948	1951	1956
N.C. 10 HAYWOOD	1,152	2,274	4,218	3,576,160	8,186,200	14,179,200
N.C. 14 PITT	920	1,543	2,608	2,564,320	4,906,840	7,766,400
N.C. 16 EDGECOMBE	1,516	3,460	4,920	4,343,720	13,099,140	19,237,500
N.C. 21 SAMPSON	1,443	2,149	3,231	4,741,760	8,131,300	11,240,400
N.C. 23 CALDWELL	4,310	6,583	7,857	14,770,880	25,888,400	36,576,000
N.C. 25 RUTHERFORD	1,507	2,213	3,778	4,739,280	8,166,680	13,017,600
N.C. 31 HALIFAX	2,017	3,200	6,781	6,177,680	11,631,480	22,999,200
N.C. 32 PERSONS	960	1,702	2,251	3,320,720	6,846,840	9,706,800
N.C. 33 MARTIN	641	1,174	1,853	1,843,080	3,822,260	6,224,400
N.C. 34 ANSON	2,167	3,054	4,245	6,903,240	11,942,580	15,838,800
N.C. 35 DAVIDSON	1,953	2,806	4,114	5,979,280	10,506,680	15,052,800
N.C. 36 RANDOLPH	2,221	4,940	7,130	10,641,680	22,728,600	31,861,960
N.C. 37 DAVIE	1,348	2,900	4,785	3,538,944	11,514,360	17,478,000
N.C. 38 CARTERET	80	158	236	226,560	570,720	799,008
N.C. 39 UNION	1,926	2,699	3,989	5,930,920	9,986,920	14,647,200
N.C. 40 BRUNSWICK	1,637	2,903	4,835	4,995,960	10,721,360	16,754,400
N.C. 43 JONES	954	1,500	2,668	3,134,180	5,849,140	9,666,000
N.C. 46 MADISON	4,248	6,657	11,204	14,026,880	24,984,380	40,306,970
N.C. 47 WAKE	1,070	2,031	3,145	3,298,560	7,730,100	11,369,000
N.C. 48 MECKLENBURG	599	1,483	2,124	2,027,340	6,128,000	9,029,220
N.C. 49 SURRY	1,403	2,161	3,301	4,734,600	8,137,880	11,920,280
N.C. 50 WAYNE	4,700	2,813	5,387	5,315,840	10,547,440	19,430,400
N.C. 51 HOKE	2,281	4,479	7,219	7,790,920	17,720,500	28,579,200
N.C. 52 CUMBERLAND	2,067	3,784	5,297	6,785,280	15,013,320	20,736,000
N.C. 53 BURKE	587	1,123	1,708	2,081,300	4,388,580	6,001,180
N.C. 55 CRAVEN	431	893	1,818	1,364,580	2,324,000	6,494,880
N.C. 56 PAMLICO	751	1,582	3,097	2,215,880	5,314,320	9,916,800
N.C. 58 LEE	1,212	2,471	4,407	3,366,600	9,254,920	16,220,400
N.C. 59 BEAUFORT	908	1,702	3,559	2,721,820	6,115,200	11,024,740
N.C. 66 CHOWAN	858	1,740	3,013	2,600,280	6,229,320	10,147,200
NORTH CAROLINA TOTAL	44,867	78,177	125,076	145,758,244	298,387,260	464,221,338

TABLE VI

SUMMARY OF LOAD ESTIMATES
(VIRGINIA)

REA SYSTEM DESIGNATION	KILOWATT DEMANDS			KILOWATT HOUR CONSUMPTION		
	1948	1951	1956	1948	1951	1956
VIRGINIA 2 CRAIG	1,116	1,658	2,465	4,716,296	6,354,580	9,714,000
VIRGINIA 11 ROCKINGHAM	2,850	5,120	6,790	12,082,560	20,941,000	25,266,000
VIRGINIA 22 CAROLINE	2,079	5,060	8,092	7,623,600	18,279,000	29,318,280
VIRGINIA 27 NOTTOWAY	3,823	7,741	9,068	14,237,200	27,654,880	50,961,840
VIRGINIA 28 LANCASTER	1,129	2,256	3,604	6,810,080	8,630,280	13,561,000
VIRGINIA 29 NELSON	1,081	3,271	4,499	11,818,800	12,146,920	17,228,000
VIRGINIA 30 BATH	2,237	3,362	4,892	6,905,560	13,150,820	19,383,600
VIRGINIA 31 MECKLENBURG	1,653	3,135	4,519	5,371,920	11,169,880	15,824,720
VIRGINIA 35 MADISON	1,098	2,393	3,513	4,087,040	8,786,440	12,487,200
VIRGINIA 36 PRINCE GEORGE	432	934	1,514	1,726,080	3,581,920	5,737,660
VIRGINIA 37 NANSEMOND	1,128	2,450	3,666	4,335,660	9,200,800	13,768,960
VIRGINIA 38 LOUDON	404	755	1,025	2,291,560	3,186,000	4,441,000
VIRGINIA 41 PRINCE WILLIAM	1,560	3,071	5,287	6,356,050	11,857,650	19,491,160
VIRGINIA TOTAL	20,590	41,206	58,934	88,362,406	154,940,170	237,183,420